

# CS70 Discussion 1d Review

AGNIBHO ROY

SUMMER 2020

## 1 Review

These are just concepts and strategies discussed during discussion section on June 25, 2020. For definitions and formulas, refer to note 4 on the course website.

### 1.1 Sets

- To prove set equality between two sets, it is important to show one of two things: either there is a bijection between  $A$  and  $B$  or that  $A \subseteq B$  and  $B \subseteq A$ .

### 1.2 Images and Bijections

- As seen in discussion, looking at images and bijections by drawing them out (which could include venn diagrams, graphing, etc.) is very helpful.
- An injection (one-to-one) means that each  $x$  value has a unique  $y$  value. A counter example is the function  $x^2$
- A surjection (onto) means that each  $y$  value has a  $x$  value that you can correspond to.
- Either injection in both directions ( $A \rightarrow B$ ) or an injection and surjection proves a bijection between the two sets  $A$  and  $B$ .

## 2 Extra Problems

These problems are not necessarily in scope. Some may be helpful on exams, but some others are just fun exercises. Reach out to me by email (agnibhoroy@berkeley.edu) if you see any mistakes or have questions about any of the questions.

### 2.1 Injective Polynomials

1. Can you find a set of values  $(a_0, a_1, a_2)$  such that  $a_0x^2 + a_1x + a_2$  is injective?
2. Can you find a set of values  $(a_0, a_1, a_2, a_3)$  such that  $a_0x^3 + a_1x^2 + a_2x + a_3$  is injective?
3. For some constants  $a_0 \dots a_n$ , can you find a way for  $a_0x^{2k} + a_1x^{2k-1} \dots a_n$  to be injective?
4. For some constants  $a_0 \dots a_n$ , can you find a way for  $a_0x^{2k+1} + a_1x^{2k} \dots a_n$  to be injective?